Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : KEBIR Given names : NASREDDINE

Status (prof., assistant prof., ...) : Associate professor

Laboratory : PBS, UMR CNRS 6270 Website address : http://pbs.labos.univ-rouen.fr/

Institution : Institut National des Sciences Appliquées - Rouen Website address : http://www.insa-rouen.fr/

Scientific competence of the supervisor:

Polymer synthesis and characterization, surface chemical modification, assessment of antibacterial properties.

Two major publications in the field proposed for the PhD :

1. MUSSARD W., KEBIR N., KRIEGEL I., ESTEVE M., SEMETEY V. Facile and Efficient Control of Bioadhesion on Poly(dimethylsiloxane) by Using a Biomimetic Approach. Angew.Chem. Int. Ed. 50: 10871-10874 (2011)
2. LOU Y. et.al Highly functionalized self-disinfecting PDMS surfaces through a direct surface photo-initiated polymerization of vinylbenzyl dimethylbutylammonium chloride. Eur. Polym. J. 152: 110473 (2021).

Website address of the personal page : https://orcid.org/0000-0002-5390-157X

Supervisor's email : nasreddine.kebir@insa-rouen.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** IV-10

Title : Development of antibacterial surfaces by photo-grafting of bioactive biosourced products

Subject :

Microbial contamination is one of a major public health problem in various fields such as medical, cosmetic or food. Due particularly to biofilm formation and appearance of multi resisting bacteria, no antimicrobial surface led to a total eradication of micro-organisms.

The thesis project aims to elaborate antibacterial surfaces based on a pH-sensitive approach. we propose (i) to covalently immobilize antibacterial compounds by photo-grafting and (ii) to introduce a pH-sensitive link of ester or hydrazone type allowing the diffusion of the antibacterial molecule only during a bacterial contamination. Indeed, local variations of pH (i.e. acidification) at the surface occur during a bacterial contamination. In addition, in order to address the toxicity of classical antibacterial molecules, natural antibacterial molecules such as essential oils and antimicrobial peptides (AMPs) will be used. Moreover, these molecules have the advantage over antibiotics and quaternary ammoniums of inducing few resistance mechanisms while presenting a broad spectrum of activity.

Keywords :

antibacterial surfaces, biomaterials, photo-grafting.

Expected collaborations :

The PhD thesis will be co-supervised with Dr Pascal THEBAULT who has a strong expertise in the field of antibacterial surfaces. He co-supervised with me the PhD thesis of Yuzhen LOU (CSC funding) (5 articles).

Background required from the applicant :

Background in biomaterials and/or surface modification (and surface characterization). Knowledge in microbiology and/or organic chemistry will be appreciate. Autonomy, rigour, initiative. Good written and spoken english.

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

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